

**REMARKS**

Claims 1-120 are pending. Claims 1-4, 7, 8, 10, 11, 15, 16, 22-24, 26, 28, 30, 35, 40, 42-44, 46, and 53 stand rejected; and claims 5, 6, 9, 12-14, 17-21, 25, 27, 29, 31-34, 36-39, 41, 45, 47-52, and 54-120 were withdrawn from consideration. By virtue of this response, claims 22 and 46 have been cancelled, claims 1, 4, 7-9, 24, 30, 35, and 42 have been amended, and no new claims have been added. Accordingly, claims 1-4, 7, 8, 10, 11, 15, 16, 23, 24, 26, 28, 30, 35, 40, 42-44, and 53 are currently under consideration.

Amendments to the claims are supported at least by the claims as originally presented; accordingly, no new matter has been added. Further, amendment and cancellation of certain claims is not to be construed as a dedication to the public of any of the subject matter of the claims as previously presented.

For the Examiner's convenience, Applicants' remarks are presented in the same order in which they were raised in the Office Action.

**Claim Objections**

Claims 1-4, 7-8, 10-11, 15-16, 22-23, 28, 30, 35, 40, 42-44, and 53 stand objected to because of the following informalities detailed on pages 2-4 of the Office Action. Applicants thank the Examiner for bringing these informalities to their attention.

(1) The phrase "recording holographic storage media" recited in claims 1, 30 and 43 is objected to as confusing. Applicants have amended claims 1, 30, and 43 as indicated herein to add clarity to the claims and overcome the objection.

(2) The phrase "the recorded data pages spatially overlap" recited in claim 3 is objected to as a contradiction with respect to its base claim and the recitation of recorded in "parallel".

Applicants respectfully disagree and submit that claim 3 is clear and not a contradiction to its base claim. The term “parallel” as used in claim 1 and throughout the specification refers to the propagation of multiple data pages of an information layer at the same time (i.e., in parallel) to interfere and record holograms in the media in parallel (i.e., at the same time), and does not exclude spatial overlap between the data pages as they are recorded in parallel. (see, e.g., paragraph [0035], lines 4-6 of the present application). Thus, the spatial overlap reference recited in claim 3 is not a contradiction because two pages may spatially overlap and be recorded at the same time (i.e., in parallel). Accordingly, the rejection should be withdrawn.

(3) The phrase “the information layer is propagated to the holographic storage medium” recited in claim 4 is objected to as confusing.

Applicants have amended claim 4 as indicated herein to add clarity to the language. In particular, claim 4 now recites, “wherein an image of the information layer is propagated...” Accordingly, Applicants believe the objection has been overcome.

(7)<sup>1</sup> It is not clear why the “data mask” has an “image plane”, as recited in claim 7.

Applicants have amended claim 7 to replace “data mask” with “modulated beam.” Accordingly, Applicants believe the objection has been overcome.

(8) The phrase “the data mask is propagated to the holographic recording medium” recited in claim 8 is wrong; the data mask which is a physical means *cannot be propagated* to the recording medium.

Applicants have amended claim 8 to recite wherein “the modulated beam is propagated to the holographic storage medium without a lens.” Accordingly, Applicants believe the objection has been overcome.

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<sup>1</sup> Applicants note that the numbering in the Office Action jumped from “(3)” to “(7)” – Applicants have numbered the responses to correspond to the numbering used in the Office Action.

(9) The phrase “holographic storage medium with a plurality of previous recorded information layers” recited in claim 16 contradicts to its based claim which states that there is just one information layer, not multiple layers.

Applicants respectfully disagree and submit that claim 16 does not contradict the base claim. Claim 1 recites that data mask “includes an information layer...” It is well known that the recitation of “a” or “one” element (in and of itself) does not limit the claim to a single element. Further, claim 1 uses the term comprising, clearly indicating that additional elements are contemplated. Accordingly, the recitation of multiple layers in claim 16 does not contradict claim 1 and the objection should be withdrawn.

(10) The phrase “read only memory” recited in claims 22 and 46 is confusing since the based claim explicitly claims a “recording process” for the holographic storage medium.

Applicants have cancelled claims 22 and 46 and the objection is now moot.

(11) The phrase “the data mask includes multiple information layers” recited in claim 28 is confusing and in contradiction to its based claim which states only one single information layer is in the data mask.

Applicants respectfully disagree and submit that claim 28 does not contradict the base claim for at least similar reasons as claim 16 discussed above. Claim 28 recites that data mask “includes an information layer...” It is well known that the recitation of “a” or “one” element (in and of itself) does not limit the claim to a single element. Further, claim 24 uses the term comprising, clearly indicating that additional elements are contemplated. Accordingly, the recitation of multiple layers in claim 28 does not contradict claim 24 and the objection should be withdrawn.

(12) Claim 30 is incomplete since simply having a light source and a data mask will not be able to record information in the holographic storage media.

Applicants have amended claim 30 to include the recitation of “a reference beam” for further clarity. As described in the specification, in some exemplary recording systems, a single light source may provide both an object beam and a reference beam. Accordingly, Applicants believe that claim 30 is complete and the objection should be withdrawn.

(13) The phrase “an optical element” recited in claim 35 is confusing and indefinite since it is no clear what is this optical element and how it is structurally related to other elements in the system.

Claim 35 has been amended to add clarity and further specify how the “optical element” is related to the system.

Applicants believe they have addressed all objections to the claims and request the objections be withdrawn.

#### **Claim Rejections under 35 USC § 102**

A. Claims 1, 4, 7, 8, 10, 11, 23, 24, and 30 stand rejected under 35 USC § 102(b) as being anticipated by the patent issued to Lesh (U.S. Patent No. 4,677,629).

Applicants have amended claim 1 herein, in part, to recite that “each data page comprises a plurality of pixels.” Support for the amendment is clearly found in the present application, for example, in paragraph [0006] where it states “a ‘page’ is a collection of bits or of pixel data stored together,” and in paragraph [0034] where it states “Each data page 210 may include an array of pixels...” Applicants have amended independent claims 24 and 30 similarly to claim 1.

Applicants submit that Lesh does not disclose or reasonable suggest such a feature in combination with the other features of claims 1, 24, or 30. For example, the Examiner states that “Lesh teaches that the photolithography mask has *an information layer* that is divided up into a *plurality of data pages*, (each “holes” [sic] on the mask serves as a data page).” (Emphasis in

original). Applicants submit that the “holes” of mask 24 shown in Fig. 3 do not disclose or reasonable suggest data pages comprising a plurality of pixels or pixel data as presently recited. In contrast “holes” of mask 24 are simply apertures to image “distinct, spatially separated beams” as shown in Fig. 3 and described generally at column 2, lines 56-62.

Moreover, Lesh relates to “phase locking diode laser arrays, and more particularly to a technique for phase locking the outputs of the diode lasers in the array with inherent light from a master diode laser.” (Lesh: col. 1, lines 13-16). Accordingly, Lesh does not reasonable suggest a data page comprising a plurality of pixels as described and recited by claims 1 and 30, and any modification to Lesh to include these feature would impermissibly alter the principle of operation of the reference and/or render the reference unsatisfactory for its intended purpose. (See, MPEP § 2143.01).

Accordingly, for at least these reasons, Applicants request withdrawal of the rejection and allowance of independent claims 1, 24, and 30 (and claims dependent therefrom).

B. Claims 43 and 53 are rejected under 35 USC § 102(b) as allegedly being anticipated by the patent issued to Hart (U.S. Patent No. 5,592,313).

Applicants have amended claim 43 herein to include features similar to those of claim 44 and submit that Hart does not disclose or suggest each and every feature of claim 43 as amended. In particular, claim 43 now recites that “the information layer comprises a layer of data divided into multiple data pages that are recorded in parallel.” This feature is similar to that originally cited in claim 44 (which was not included in this rejection); accordingly, no new matter has been added.

Applicants submit that Hart fails to disclose or suggest this feature of claim 43. In contrast to the features of claim 43, Hart teaches a method and system “to sequentially project a plurality of two-dimensional images, for example a plurality of data comprising a CT scan data set.” (Hart: col. (Emphasis added). Thus, Hart teaches recording multiple images sequentially, and does not disclose or reasonably suggest an information layer divided into multiple data pages that are recorded in parallel as recited in claim 43.

Accordingly, for at least these reasons the rejection should be withdrawn and claims 43 (and claim 53 which depends therefrom) allowed.

### **Claim Rejections under 35 USC § 103**

A. Claims 2, 3, 22, and 35 stand rejected under 35 USC § 103(a) as being unpatentable over the patent issued to Lesh.

Claims 2, 3, 22, and 35 depend from claims 1 and 30 respectively and are allowable over Lesh for at least similar reasons as claims 1 and 30 discussed herein.

B. Claims 15, 16, 26, 28, 40, 42, 43, 44, 46, and 53 stand rejected under 35 USC § 103(a) as being unpatentable over the patent issued to Lesh in view of the patent issued to Anderson et al. (U.S. Patent No. 6,653,067).

Claims 15, 16, 26, 28, 40, and 42 depend from claims 1 and 30 respectively and are allowable over Lesh for at least similar reasons as claims 1 and 30 discussed herein. The addition of Anderson does not cure the deficiencies of Lesh, nor is Anderson alleged to. Accordingly, the rejection should be withdrawn with respect to these claims.

With regard to claims 43, 44, 46, and 53, Applicants initially note that these claims do not depend from claims 1, 24, and 30. In any event, Applicants submit that it has not been shown that Lesh in light of Anderson discloses or suggests each and every feature of claim 43 as amended to include features similar to claim 44. For example, neither Lesh nor Anderson disclose or suggest a method for recording holograms in holographic storage media where an information layer in a holographic master data mask “comprises a layer of data divided into multiple data pages that are recorded in parallel, wherein each data page comprises a plurality of pixels.”

As previously described with reference to claim 1, Lesh does not disclose or suggest a plurality of data pages, each data page comprising a plurality of pixels. In contrast “holes” of mask 24 are simply apertures to image “distinct, spatially separated beams” as shown in Fig. 3 and

described at column 2, lines 56-62. Moreover, the references alone or in combination do not suggest the features of claim 43. Lesh relates to “phase locking diode laser arrays, and more particularly to a technique for phase locking the outputs of the diode lasers in the array with inherent light from a master diode laser.” (Lesh: col. 1, lines 13-16). Accordingly, Lesh does not reasonable suggest a data page comprising a plurality of pixels as described and recited by claim 43, and any modification to Lesh to include these feature would impermissibly alter the principle of operation of the reference and/or render the reference unsatisfactory for its intended purpose. (See, MPEP § 2143.01).

Furthermore, Applicants submit that Lesh and Anderson are non-analogous art and are therefore improperly combined in the rejection. To rely on a reference under 35 U.S.C. § 103(a), a reference must be analogous prior art. MPEP § 2141.01(a). In particular, “the reference must either be in the field of applicant’s endeavor or, if not, then be reasonably pertinent to the particular problem with which the invention was concerned.” *In re Oetiker*, 977 F.2d, 1443, 1446 (Fed. Cir. 1992). As further explained in *In re Clay*, 966 F.2d 656, 659 (Fed. Cir. 1992), a reference is reasonably pertinent if it “logically would have commended itself to an inventor’s attention in considering his problem.”

In the present instance it is clear that a high speed printing apparatus of the light beam deflection type as taught by Anderson (Col. 1, lines 3-6 and 48-57) and in the field of printing apparatuses is not in the same field of Applicants endeavor regarding holographic data storage media and systems, and recording and reading page based holographic storage media (e.g., compare Anderson, col. 1, line 48 - col. 2, line 20 with paragraphs [0002] and [0010]-[0014] of the present application). It is further evident that Anderson is not reasonably pertinent to the problem addressed by the present application regarding storage media that permits relatively higher, parallel readout of data pages (see, e.g., paragraph [0009] of the present application). In contrast, the problem addressed in Anderson includes “an improved printing apparatus.... More specifically, an object of this invention is a printing apparatus of the light beam deflection type which is characterized by high-speed, reliability, simplicity and a minimal number of mechanically-moving parts.” (Anderson: col. 1, lines 48-53). A reference to a process for an improved printing apparatus (for e.g., improved

speed, reduced number of moving parts) would not have logically commended itself to an inventor's attention dealing with holographic data storage media and systems. Therefore, Anderson is non-analogous art and is inappropriate under an obviousness rejection.

Additionally, Applicants submit that Lesh is also non-analogous art. Again, it is clear that "an array of diode lasers ...with a single master diode laser for phase locking the outputs of the diode lasers through a hologram prepared to focus light into a set of distinct, spatially separated beams..." as disclosed by Lesh (col. 1, lines 13-16) and in the field of "phase locking diode laser arrays" (Lesh: col. 1, lines 13-16) is not in the same field of Applicants endeavor regarding holographic data storage media and systems, and recording and reading page based holographic storage media (e.g., compare Lesh col. 2, line 56 to col. 3, line 10 with paragraphs [0002] and [0010]-[0014] of the present application). It is further evident that Lesh is not reasonably pertinent to the problem addressed by the present application regarding storage media that permits relatively higher, parallel readout of data pages (see, e.g., paragraph [0009] of the present application). In contrast, the problem addressed by Lesh is clearly stated: "the problem is to phase synchronize the outputs of the diode lasers in the array such that the combined output is phase coherent and contains negligible far-file supermodes...." (Lesh: col. 2, lines 49-53). A reference to a process for an array of laser diodes to solve the aforementioned problem would not have logically commended itself to an inventor's attention dealing with holographic data storage media and systems. Therefore, Lesh is non-analogous art and is inappropriate under an obviousness rejection.

For at least these reasons, one of ordinary skill in the art would not have reasonable combined and modified Lesh to meet the features of claim 43. Accordingly, the rejection should be withdrawn and the claims allowed.



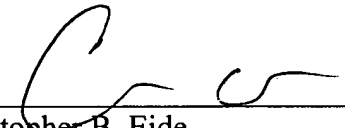
**CONCLUSION**

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue. If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

In the event the U.S. Patent and Trademark office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 03-1952 referencing docket no. 495812004700. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

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